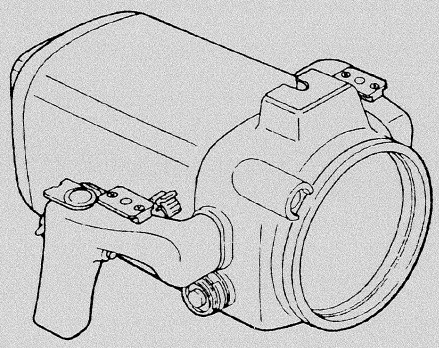
SERV. 64274

MPK-TRA2/TRA2K

SERVICE MANUAL

US Model
Canadian Model
AEP Model
UK Model
MPK-TRA2

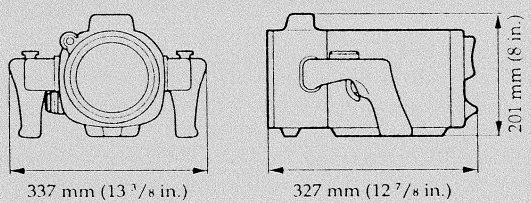
AEP Model
UK Model
MPK-TRA2K



Handycam

SPECIFICATIONS

Compatible video camera recorder
See page 3.
Material Aluminum alloy, glass, plastic
Waterproofing O-ring, 2 buckles
Usable depth Up to 75 meters (246 feet)
Underwater microphone
Condenser microphone (monaural)
Controllable function
Power on/off, recording start/stop, auto focus on/off, power zooming
Dimensions



337 mm (13 3/8 in.) 327 mm (12 7/8 in.)

Mass Approx. 8 kg (17 lb 10 oz)
Supplied accessories
MPK-TRA2:
Adaptor (1)
O-rings (2)
Grease (1)
MPK-TRA2K:
Carrying case (1)
Shoulder strap (1)
Keys (2)
Adaptor (1)
O-rings (2)
Grease (1)
Recommended accessories
Underwater video light **HVL-M20, HVL-80DA**
Maintenance kit **ACC-810M**
Color filter **VF-M150**

Design and specifications are subject to change without notice.

'Features

The **MPK-TRA2/TRA2K** marine pack allows the following 8 mm video camera recorders to be used underwater.

CCD-TR1/TR1E	CCD-TR450E
CCD-TR3/TR3E	CCD-TR470E
CCD-TR8/TR8E	CCD-TR530E
CCD-TR45/TR45E	CCD-TR550/TR550E
CCD-TR55/TR55E	CCD-TR606E
CCD-TR75/TR75E	CCD-TR650E
CCD-TR105/TR105E	CCD-TR705/TR705E
CCD-TR202E	CCD-TR750/TR750E
CCD-TR212	CCD-TR805/TR805E
CCD-TR303/TR303E	CCD-TR2000/TR2000E
CCD-TR305/TR305E	CCD-FX200E
CCD-TR323/TR323E	CCD-FX300/FX300E
CCD-TR333/TR333E	CCD-FX400/FX400E
CCD-TR350E	CCD-FX500/FX500E
CCD-TR353/TR353E	CCD-FX700/FX700E

(The illustrations are of the **CCD-TR805E**.)

- **Recording at a depth of 75 meters (246 feet) is possible.**
- **The following operations can be performed underwater.**
  Power on/off
  Auto focusing on/off (Except for **CCD-FX300/FX300E/FX400/FX400E**)
  Recording start/stop
  Power zooming

HANDYCAM MARINE PACK

SONY®

MICROFILM

SECTION 1
GENERAL

This section is extracted from instruction manual.

Precautions

On the video camera recorder

Take care not to expose the equipment to salty air nor to drip water on the equipment.

- Do not open the marine pack on the sea or at the seaside. Preparations such as installing and checking the equipment should be made in a place with low humidity and no salty air.
- When a video camera recorder is to be used by the sea for a long time, we recommend that they are checked periodically by a Sony service facility.
- If the equipment becomes wet, take it immediately to the nearest Sony service facility for preventive maintenance.

On power source for the video camera recorder

Use the battery pack **NP-77H**, **NP-77HD**, or **NP-588**. For the **CCD-TR1/TR1E/TR3/TR3E/TR8/TR8E**, use the **NP-500**.

On the marine pack

- If you put the marine pack in the water after you opened and jointed the front and rear shells in a place with high temperature and high humidity, moisture condensation may occur, causing the glass to fog up.
- The waterproof integrity of the marine pack is maintained by the O-ring, and the groove and surface where it touches. Be especially careful not to damage or deform that area.
- Do not leave the marine pack under direct sunlight for a long period of time, otherwise the temperature in the marine pack may rise and the equipment in the marine pack may be damaged.
- If you cannot avoid leaving the marine pack under direct sunlight, be sure to cover the marine pack with a towel or other protection.
- Do not throw the marine pack into the water. Lower it gently into the water.

On recording underwater

- Check that the equipment operates correctly and there is no water leak at a depth of about one meter (3 feet) before you dive deeper.
- Be sure to follow the safety rules for diving such as diving period and depth.
- Remove the bubbles from outside of the front glass.

Sony does not accept liability for damage to the video camera recorder, battery, etc. in the marine pack and for the cost of recording if water leak occurs caused by incorrect operation.

On maintenance

After recording in the sea, submerge the marine pack with the buckles tightly fastened in fresh water for a while to remove the sea water. Then rinse it with fresh water and dry it with a soft cloth.

- Every time after you use the marine pack and the video camera recorder underwater, clean the video camera recorder and inside of the marine pack with a dry soft cloth. Do not use any type of solvent, such as alcohol or benzine for cleaning, as this might damage the finish.
- When you store the marine pack, grease the O-ring, put it in the groove correctly. Joint the front and rear shells and place it in a cool place without fastening the buckles. Avoid storing the marine pack in a hot or very cold place, in a place subject to direct sunlight or excessive dust, or together with naphthalene or camphor. This will damage the marine pack.

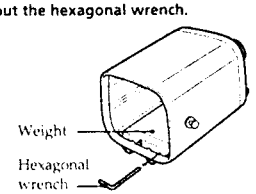
On transportation

- To transport the marine pack, be sure to remove the video camera recorder from the marine pack.
- To transport the marine pack by air or by car, use the supplied carrying case.

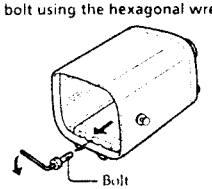
To remove the weight

You can remove the weight in the rear shell.

1 Pull out the hexagonal wrench.



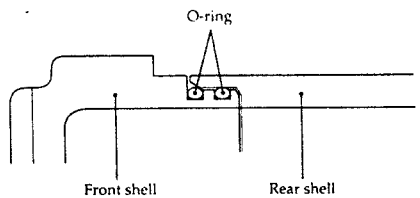
2 Remove the bolt using the hexagonal wrench.



When you use the marine pack, replace the weight as it was.

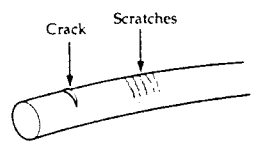
Notes on the o-ring

The O-ring assures the waterproof function of the marine pack. To maintain waterproof integrity, use it correctly. Incorrect handling may cause water to leak in.



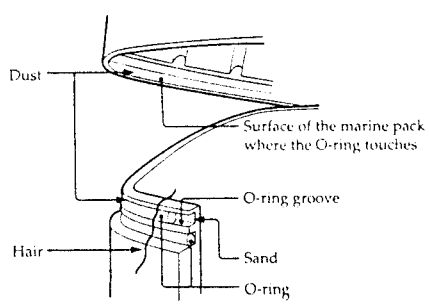
Check that there are no scratches or cracks.

Scratches or cracks on the O-ring may cause water to leak in. If there are any, replace the damaged O-ring with a new one. Do not remove the O-ring from the groove with a metal tool or a tool with a sharp point.



Remove any dust, sand or hair from the O-ring.

Check there is no dust, sand or hair on the O-ring, or in the groove or on the surface of the marine pack where it touches. If there is, remove them completely, or the O-ring and the surface of the marine pack may be damaged and water may leak in.

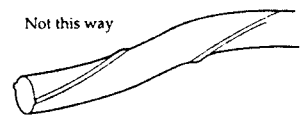


Grease the O-ring

The grease protects the O-ring from wear.
Check that there are no cracks or dust on the O-ring, then grease it using a finger. During greasing, recheck that there are no cracks or dust.
Never use cloth or paper for greasing because the fibers may cling.
Do not use any type of grease other then the supplied one, or it may damage the O-ring.

Do not twist the O-ring.

Put the O-ring in the groove evenly. Never twist it.



Do not trap the O-ring with the marine pack

When jointing the front and rear shells, take care not to trap the O-ring between the front and rear shells. If this happens, not only will the O-ring be damaged, but also water may leak in.

Storage

Put the supplied spare O-rings in the original carton and store it in a cool place.

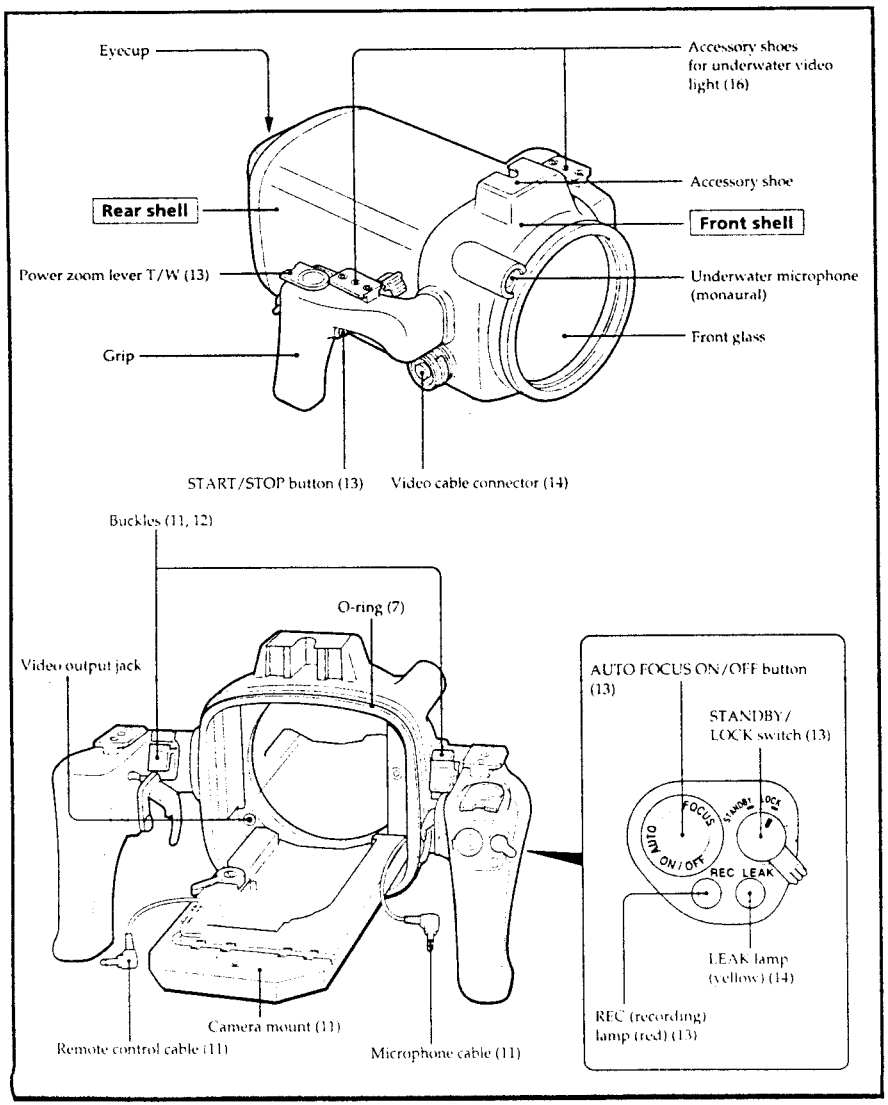
- Do not expose the O-ring to direct sunlight.
- Do not place a heavy object on the O-ring.
- Do not fold the O-ring.

Useful life of the O-ring.

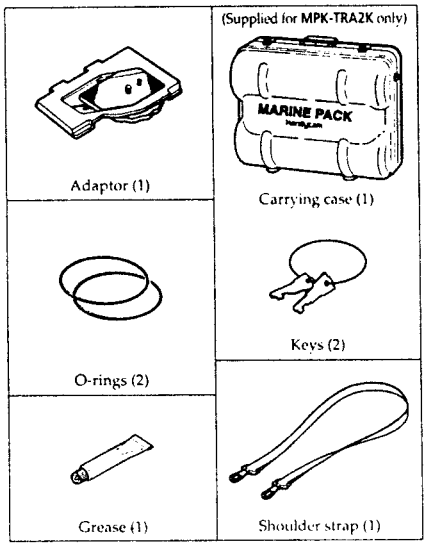
It depends upon the maintenance and the length of use, but we recommend changing it every one or two years. Use the Sony **ACC-810M** marine pack maintenance kit (not supplied) to replace.

Labeling the parts and controls

• For the use of each part or control, see the pages indicated in parenthesis.

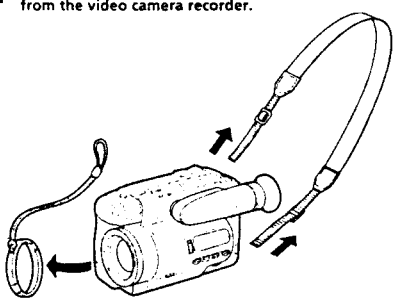


Supplied accessories

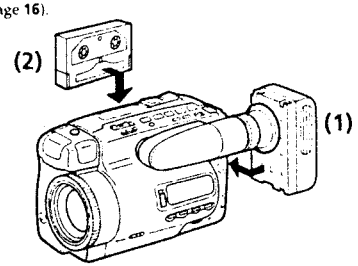


Attaching the video camera recorder to the marine pack

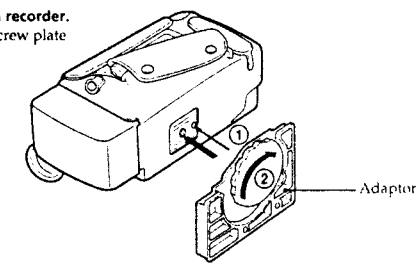
1 **Remove the lens cap, shoulder strap, filter, etc., from the video camera recorder.**



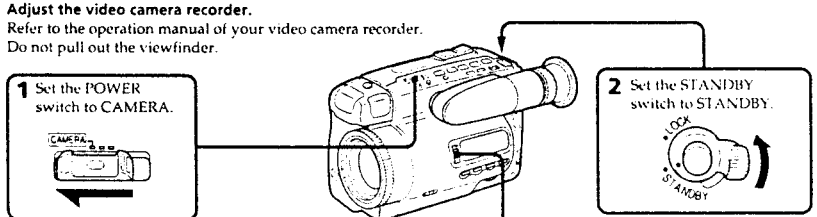
2 **Attach a charged battery pack (1) and a video cassette (2).**
If you use a wide conversion lens (not supplied), attach it as well (except for **CCD-FX** models, see page **16**).



3 **Attach the adaptor to the video camera recorder.**
Check that the position of the mounting screw plate is correct. (See pages **8** and **9**.)



4 **Adjust the video camera recorder.**
Refer to the operation manual of your video camera recorder.
Do not pull out the viewfinder.

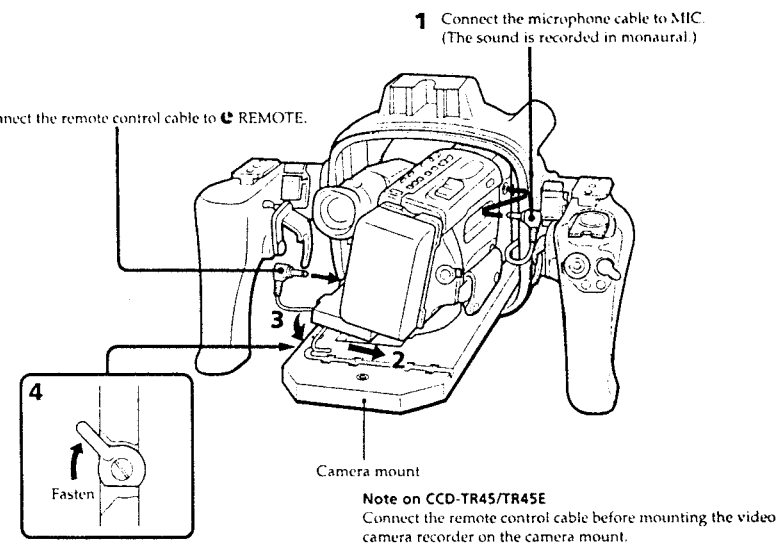

1 Set the POWER switch to CAMERA.
CAMERA
2 Set the STANDBY switch to STANDBY.
LOCK
STANDBY
3 Release automatic adjustment mode and set to manual adjustment mode.

The following adjustments are needed when your video camera recorder has the corresponding function.
Refer to the operation manual of the video camera recorder for details.

White balance	Normally set to ☀ (outdoor). Set to ☼ (indoor) for night diving.
Shutter speed	Set where no indicator appears.
Program AE	Set where no indicator appears.
Brightness	Turn off the indicator.

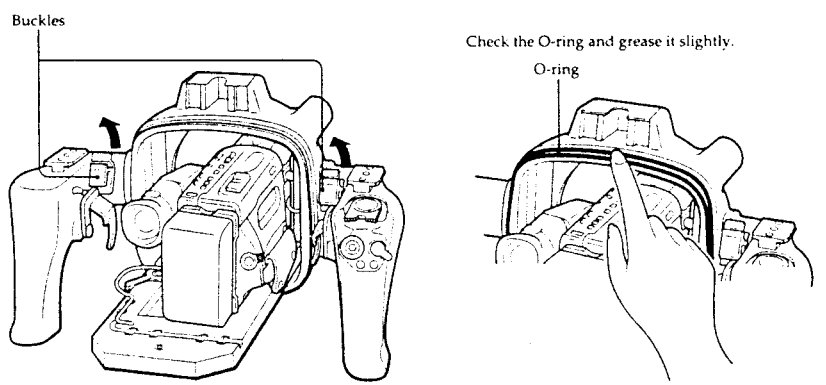
Note on CCD-FX300/FX300E/FX400/FX400E
Set the focus to auto focus mode.

5 **Attach the video camera recorder to the marine pack.**
Check the position of the adaptor. (See pages **8** and **9**.)



Note on CCD-TR45/TR45E
Connect the remote control cable before mounting the video camera recorder on the camera mount.

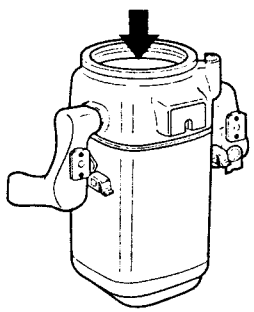
6 **Raise the buckles until they stop.**



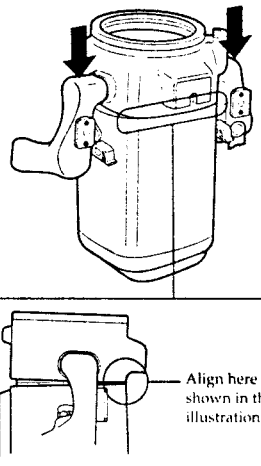
(To be continued)

7 Attach the front shell to the rear shell.

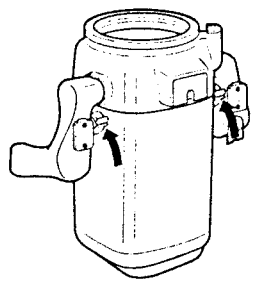
1 Put the front shell on the rear shell.



2 Press the top of both grips strongly.



3 Lower both buckles at the same time until they are locked. You will hear a click.

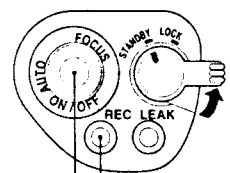


Now you are ready for underwater recording.

Set the STANDBY/LOCK switch of the marine pack to LOCK.
If you set it to STANDBY, the battery may be used up before recording.

Recording

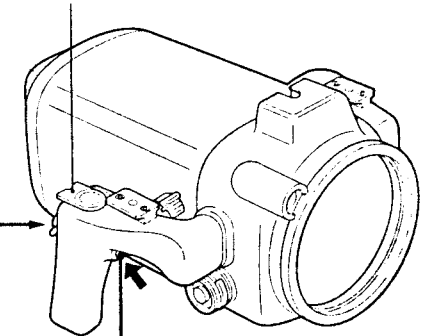
1 Set the STANDBY/LOCK switch to STANDBY.



The REC lamp (red) lights up during recording.

AUTO FOCUS ON/OFF button

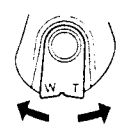
Power zoom lever



2 Press START/STOP button to start recording.

To zoom

Slide the power zoom lever towards T for telephoto (subject appears closer) or W for wide-angle (subject appears farther away). The zooming speed can be changed for some models of the video camera recorder from a slow speed to faster by sliding the zooming lever a little to more.



Wide-angle Telephoto

When you set the power zoom lever to the full wide-angle position (macro), specks or bubbles on the front glass may come into focus. In this case, slide the power zoom lever a little towards T and return towards W.

To keep a subject in focus

After you focus on a subject, press the AUTO FOCUS ON/OFF button to set the video camera recorder to manual focus mode.
Even if fish swim between the video camera recorder and the subject, you can still keep the subject in focus.

Note on CCD-FX300/FX300E/FX400/FX400E
The AUTO FOCUS ON/OFF button is not operative for these models.
Set the video camera recorder to auto focus mode.

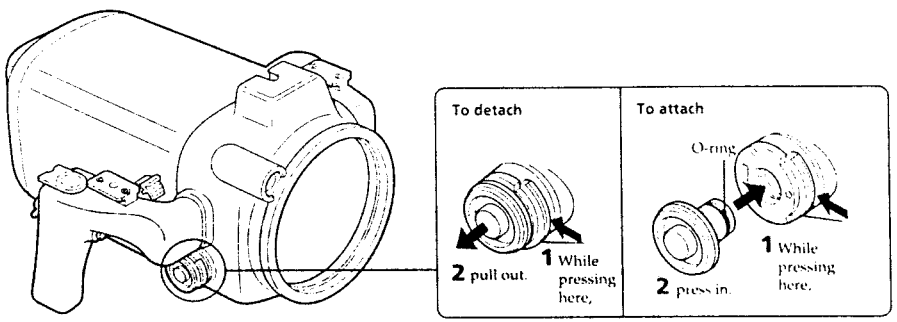
To stop recording

Press the START/STOP button.

To attach/detach the lid of the video cable connector

A video cable connector is provided so that video equipment can be connected to the marine pack in the future.

When you reattach the lid, grease the O-ring of the lid before inserting it into the connector.



Note

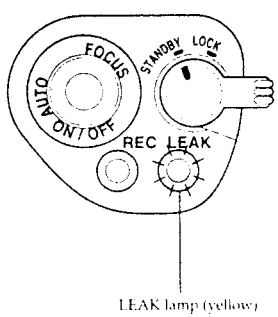
Do not detach the lid underwater.

When the LEAK lamp flashes

If water happens to leak in, the LEAK lamp (yellow) flashes.

In such a case, remove the marine pack from the water as soon as possible, keeping it horizontal. Be sure to surface following the safety rules for diving.
Dry the marine pack with a soft cloth and then open it.
To switch off the lamp, disconnect the remote control cable.
Check the cause of the leak.

If the video camera recorder is wet, take it to the nearest Sony service facility immediately.



Removing the video camera recorder

Before opening the marine pack, rinse it with fresh water and dry with a soft cloth.

Note

When you open the marine pack, take care the following points to prevent the video camera recorder from getting wet.

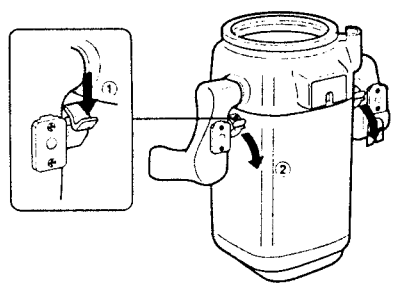
- Dry the marine pack well.
- Wipe off any water between the front and rear shells with a towel.
- Make sure you are dry. Take care that no water drops from your wet suit.

1 Remove the accessories.

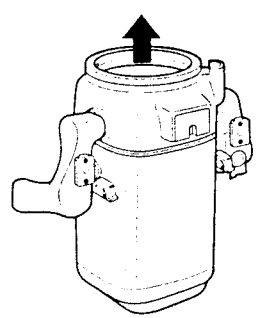
2 Open the marine pack.

1 Before opening the marine pack, rinse it with fresh water and dry with a soft cloth.

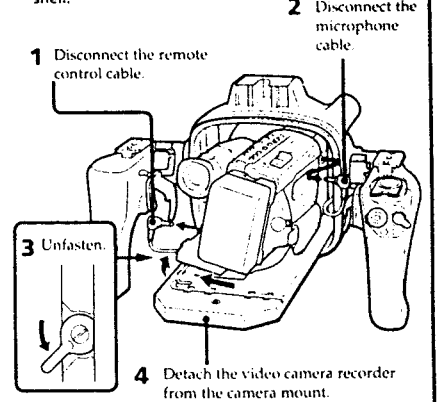
2 Unfasten the both buckles.



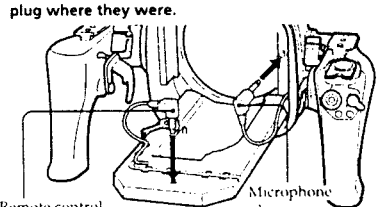
3 Remove the front shell.



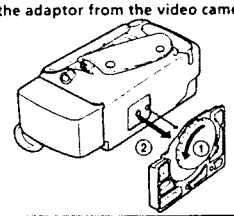
3 Take the video camera recorder out of the front shell.


2 Disconnect the microphone cable.
1 Disconnect the remote control cable.
3 Unfasten.
4 Detach the video camera recorder from the camera mount.

4 Insert the remote control plug and the microphone plug where they were.



5 Remove the adaptor from the video camera recorder.



Underwater recording

Recording underwater is different from recording on land because it is affected by the clarity and depth of the water and the light conditions. The followings are hints for good recording underwater.

Color characteristics underwater

Water absorbs light, especially red light, so that objects in deep water are seen as bluish. The color of objects is affected by the clarity of the water.
To record in natural color, use the Sony **VF-M150** color filter (not supplied).

Best time for recording

The best recording time is from 10:00 a.m. to 2:00 p.m. When the sun is high in the sky, optimum results can be obtained.

Subject size underwater

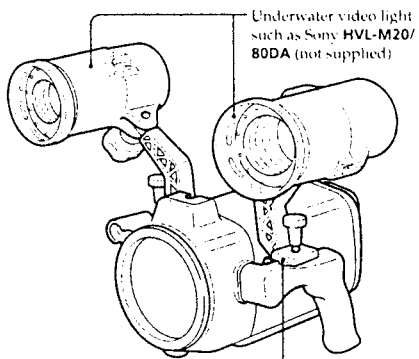
Since the refractive index underwater is higher than that in air, an object is visible by 1/4 more closely, and therefore larger. This phenomenon affects the lens on the video camera recorder as well as the human eye. Using a **wide-conversion lens** is recommended. (You cannot attach a wide conversion lens to a **CCD-FX** model to use it with this marine pack.)

Camera work in slow and stable motion

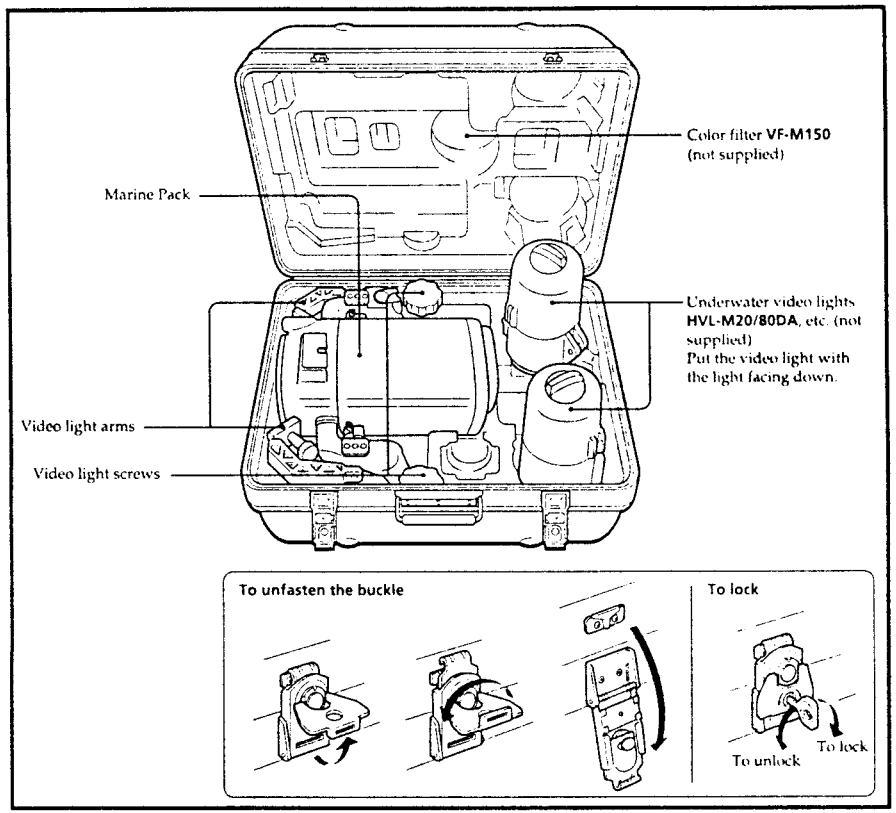
When recording, keep your body stable.
An unstable shot will be magnified on the TV screen. Move the video camera recording as slowly as possible. As most of the object underwater move, you can record a good program without moving the video camera recorder.

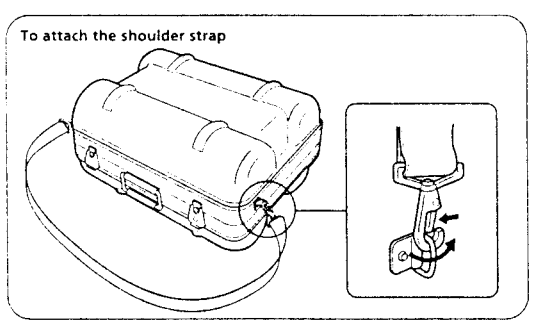
Underwater video light

In a deep water or under rocks where direct sunlight does not reach, recording with the underwater video light is recommended.
To record at night, use an additional powerful underwater video light.



About the carrying case (supplied for MPK-TRA2K only)





Note

Take care not to drip water inside the case. Dry the equipment before you put them in the case. Do not use any type of solvent, such as alcohol or benzine for cleaning the case, as this might damage the finish.

1.Concerning Defects

Marine Pack defects are classified as the three following types.

1) Operational defects

This type mainly involves malfunctions caused by electrical circuit or parts defects. Repair is the same as for normal products.

2) Damaged and missing parts

Waterproofing is sometimes affected by the locations of defects and symptoms. Before making repairs, always use the check list to check the type of defect.

Note : Refer to pages 10 and 11 for the check list.

3) Water leaks

After the discovery of a defect or after making repairs, it is necessary to perform either a hydraulic pressure test or simple water leak test using a water tank.

2. Concerning Water Leaks

To ensure waterproofing, O-rings are used in the holes in the Marine Pack housing for openings, shafts, display windows and the front glass. Water leaks are possible in any of these locations but the conditions under which water leaks occur differ for the openings and the other parts.

1) Water leaks at openings

Openings are waterproofed using O-rings compressed by the force of the buckle spring.

Near the surface of the water, where little water pressure is applied to Marine Pack, the force of the buckle alone provides sufficient waterproofing. As the water pressure applied to Marine Pack increases at greater depths, however, the force applied to the O-rings increases due to the water pressure to increase the waterproofing.

Because of this, due to the type of waterproofing construction used, opening water leaks are more prone to occur in shallow water (approx. 2 meters) than in deep water.

Also, since there is a gap between the front and rear housings, sand and dirt tend to enter and adhere to the O-ring in shallow water. When the cover is opened, this sand and dirt can then enter under the O-ring and cause a water leak the next time Marine Pack is used.

This, most water leaks in the openings are the result of adhered dirt, sand, hair and other foreigh matter as well as O-ring and housing damage due to careless handing.

2) Water leaks at other openings

Parts where there are holes in the housing (shafts, display window, front and rear glass) are constructed with O-rings mechanically compressed by screws and nuts.

Due to the construction, these places cannot be reached with the hands : therefore, the waterproofing is more secure than that of the openings.

The causes of water leaks are damage of the parts compressing the O-rings, loosening of the screws and nuts fastening the parts and improper reassembly.

3. Water Leak Check Methods

After the discovery and repair of water leak, it is necessary to perform a hydraulic pressure test and water leak test using a water tank.

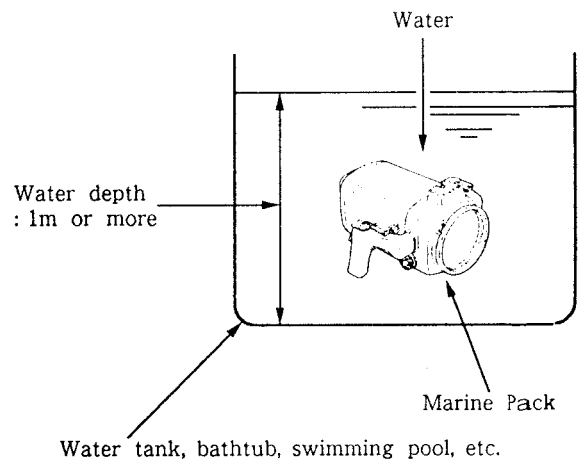
1) Opening water leak check method

As was mentioned above, due to the construction, water leaks in openings are more prone to occur in shallow water than in deep water. Consequently, a simple water leak test using a water tank is sufficient in many cases, without performing a hydraulic pressure test.

***Water leak test**

In this method, Marine Pack immersed in a tank filled with water and checked for water leaks.

Marine Pack should be left immersed in the water tank (or bathtub, swimming pool, etc.) for at least 15-20 minutes with the covers closed. The water depth should be at least 1 meter.



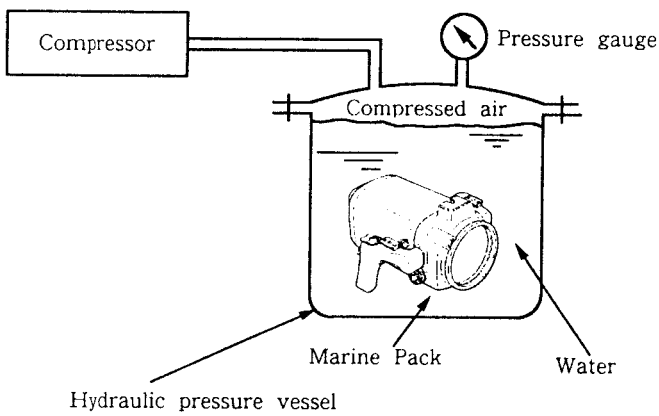
2) Water leak check methods for other waterproofed locations.

In addition to water leaks caused by damaged parts and loose screws, there are also water leaks at other waterproofed locations which cannot be detected with a water leak test : therefore, the hydraulic pressure test must be used.

****Hydraulic pressure test**

In this test, Marine Pack is immersed in a water tank called a hydraulic pressure vessel, pressure is applied using compressed air and checks are made for water leaks and the ability to withstand water pressure is tested.

Extreme pressure is applied to Marine Pack underwater. Water leaks may occur when this pressure is first applied. In such cases, the water leak check must be made using the hydraulic pressure test with a hydraulic pressure vessel.



4. Causes of Water Leaks (excluding parts damage)

Water leaks in openings

1) When the covers have been closed with sand, dirt and hair adhered to the O-rings, O-ring grooves, housing O-ring contact surface or waterproof packing.
2) When the cover is closed with an O-ring out of its groove or a cord is caught in the cover.
3) When an O-ring is damaged or cracked (aging).
4) When there is a long scratch which crosses the housing O-ring contact surface.
5) When a cover is not tightly closed due to a defective buckle.

- Water leaks at other waterproofed locations

6) When there are scratches on the surfaces of the parts which compress the O-rings.
7) When the Parts which compress are loose.
8) When tightening with sand, dirt and hair adhered to an O-ring or part which compresses the O-ring.
9) When an O-ring has not been installed.

Causes 1)-5) and 9) above can be discovered relatively easily using the water leak test described above.

5. Water Leak Repair Methods

- Relatively light scratches on O-ring contact surfaces can often by repaired by polishing.

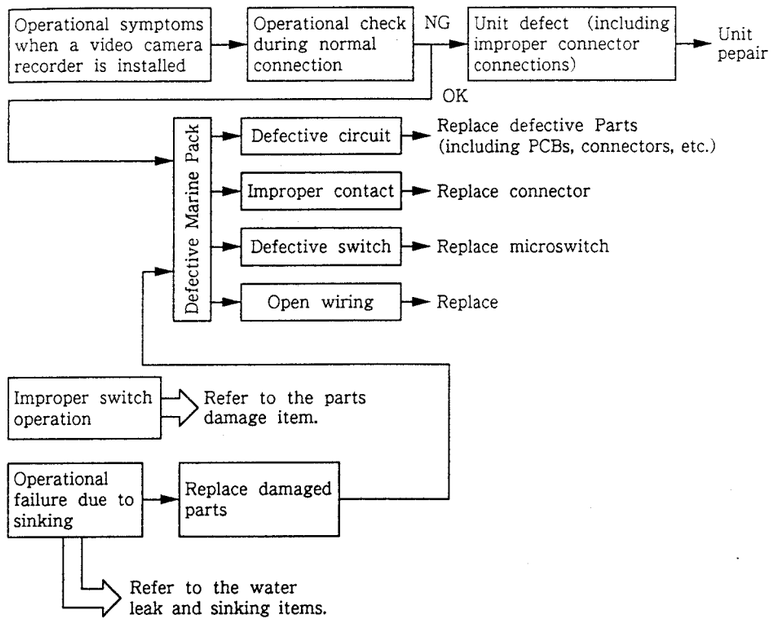
1) Only extermely light scratches can be repaired.
2) Use number 600-1000 waterproof sandpaper for repairs and apply water while polishing.
3) Polish the scratch area smoothly using care not to create local indentations.
4) Do not use putty to make repairs since such repairs will fail under water pressure.

- Checks and cautions

1) Make sure that there are no scratches on the housing O-ring contact surfaces.
2) Make sure that there are no scratches or cracks in the O-rings.
3) Always coat the O-rings with grease by hand and make sure that the O-rings are not twisted when installed.

6. Repair Location and Hydraulic Pressure Test

When a defect is discovered or a repair is made at a location related to the waterproofness of Marine Pack, the hydraulic pressure test must be performed.
Repairs at locations which require the hydraulic pressure test, and the hydraulic pressure test itself, are performed at the factory : therefore, always check the type of defect using the check list before making repairs.

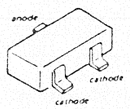
Type of defect	Defect location and repair method	Hydraulic pressur test
Improper operation		Unnecessary

Type of defect	Defect location/symptom			Repair method	Hydraulic pressure test
Parts damage	Housing related	Exterior part	Scratch	Replace part	Necessary
		Wateaproofing O-ring	Light damage damage	Polish using waterproof sandpaper	Necessary
			Heavy damage	Replace part	
		O-ring	Scratch, agin	Replace part (life : 2 years)	Unnecessary
		Buckle (including mounting screw)	Damage or coming off	Replace part (repair housing when screws are affected)	Unnecessary
		Underwater microphone	Damage	Replace part	Necessary
	Grip area	Deformation, damage	Light damage	Replace part	Unnecessary
			Heavy damage	Housing repair (overhaul mounting section)	Unnecessary
	Front glass section	Front glass	Damage	Replace part	Necessary
	Rear glass section	Eye cap	Damage, loss	Replace part	Unnecessary
		Rear glass	Damage	Replace part	Necessary
	(Switch related) REC START/STOP switch Power zoom switch (lever) STANDBY/LOCK switch (lever) AUTO FOCUS ON/OFF switch	Lever	Damage or coming off	Replace part	Necessary
		Switch	Deformation, scratch, damage or coming off	Replace part	Necessary
	Video camera recorder mounting base area	Camera mount	Damage	Replace part	Unnecessary
		Water leakage sensor box.	Damage	Replace part	Unnecessary
Sinking due to water leak	Determine cause using the hydraulic pressure test.			Repair the defect or replace the part.	Necessary

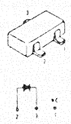
SECTION 2
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAM

2-1. SEMICONDUCTOR LEAD LAYOUTS

1SS181

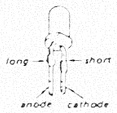


1SS184
RD9.1M-B2



DTC114EK
DTC115TK-146
DTC144EK

TLR123
TLY123



For printed wiring boards :

- ○— : indicates a lead wire mounted on the componet side.
- ● : Through hole.
- ▒ : Pattern from the side which enables seeing. (The other layers' patterns are not indicated)

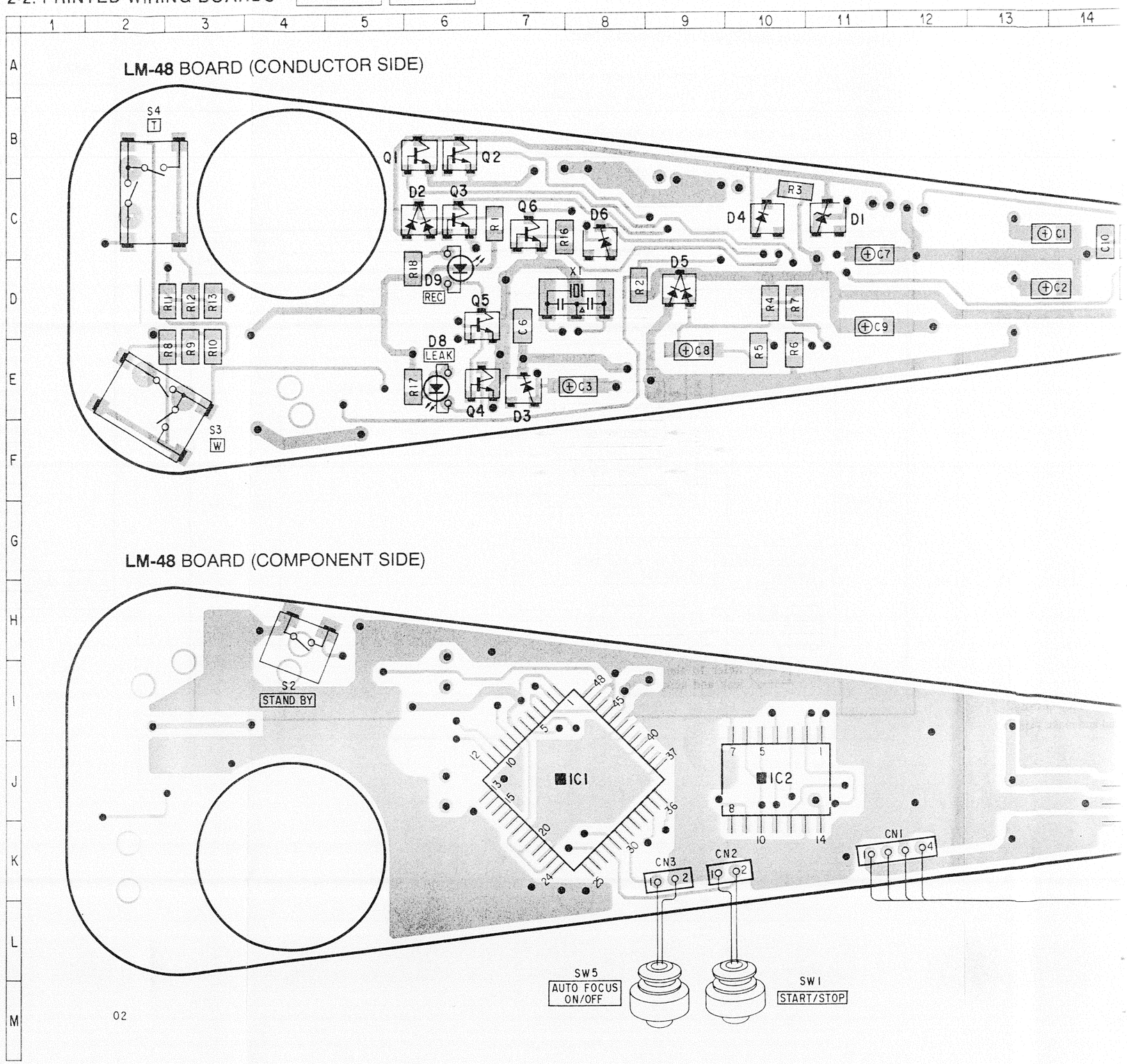
Caution :
Pattern face side (Conductor Side) : Parts on the pattern face side seen from the pattern face are indicated.
Parts face side : (Component side) Parts on the parts face side seen from the parts face are indicated.

- SEMICONDUCTOR LOCATION

IC1	J-8
IC2	J-10
IC3	J-15
D1	C-11
D2	C-6
D3	E-7
D4	C-10
D5	D-9
D6	C-8
D7	C-15
D8	E-6
D9	D-6
Q1	B-6
Q2	B-6
Q3	C-6
Q4	E-6
Q5	D-6
Q6	C-7
CN1	K-12
CN2	K-10
CN3	K-9

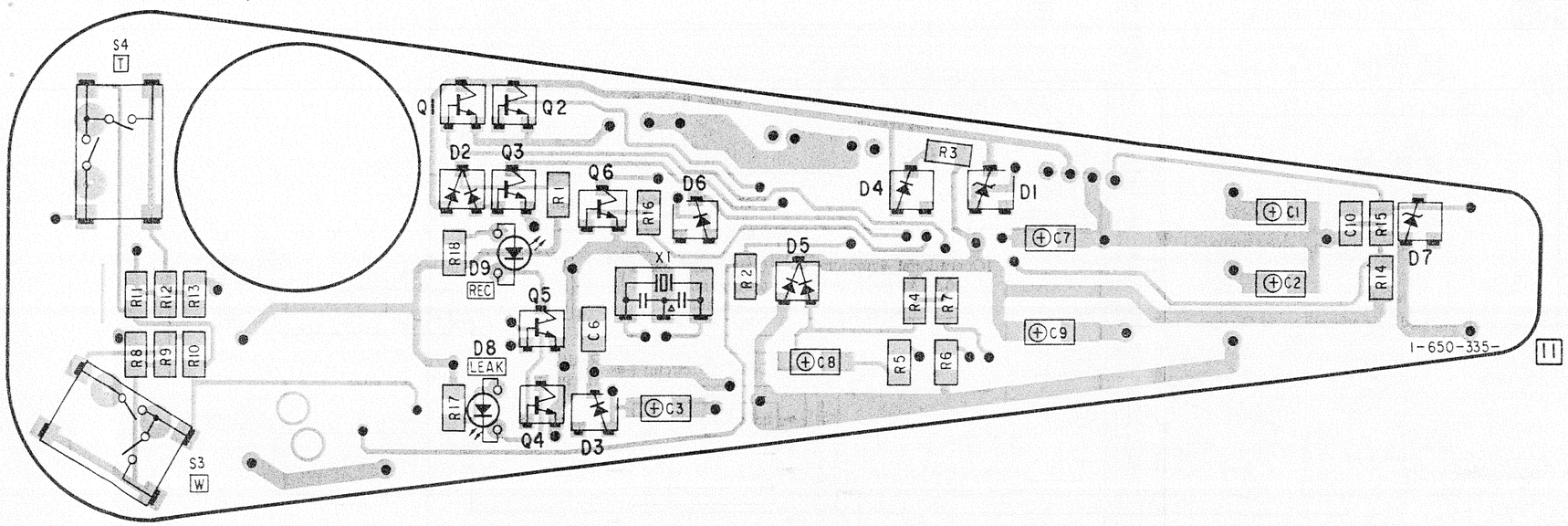
2-2. PRINTED WIRING BOARDS LM-48 LM-44 (Ref. No. LM-48 BOARD : 1,000 Series)

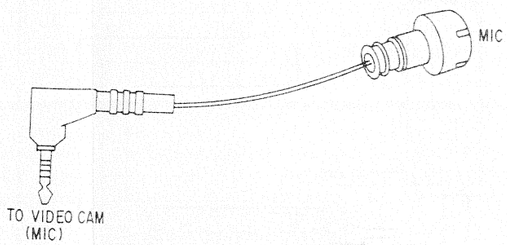
LM-48 BOARD (CONDUCTOR SIDE)



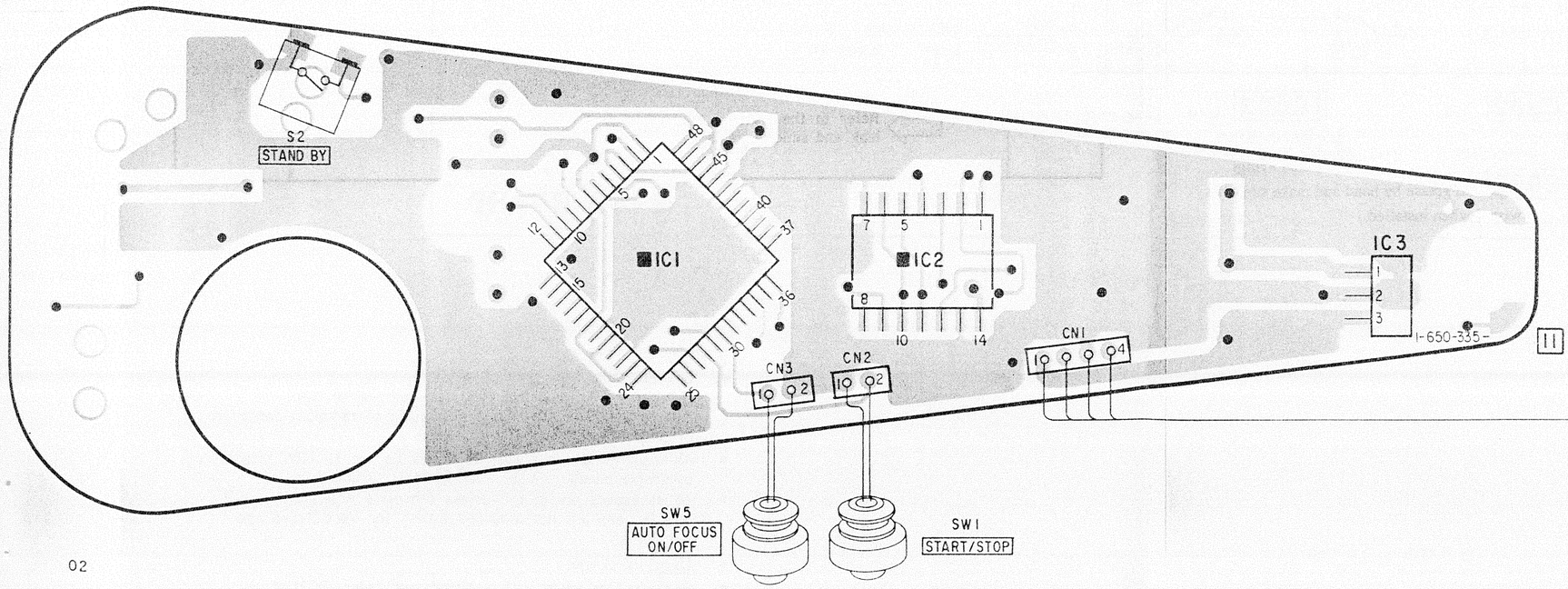
02

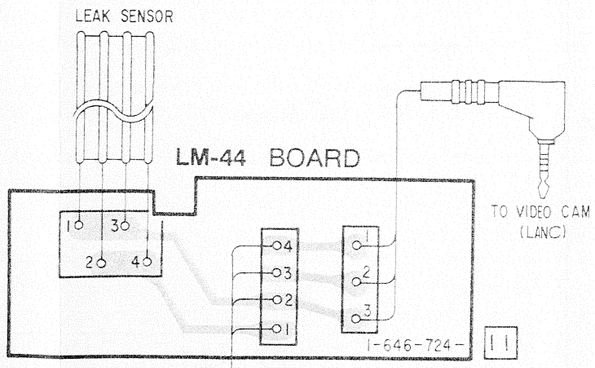
LM-48 BOARD (CONDUCTOR SIDE)





LM-48 BOARD (COMPONENT SIDE)

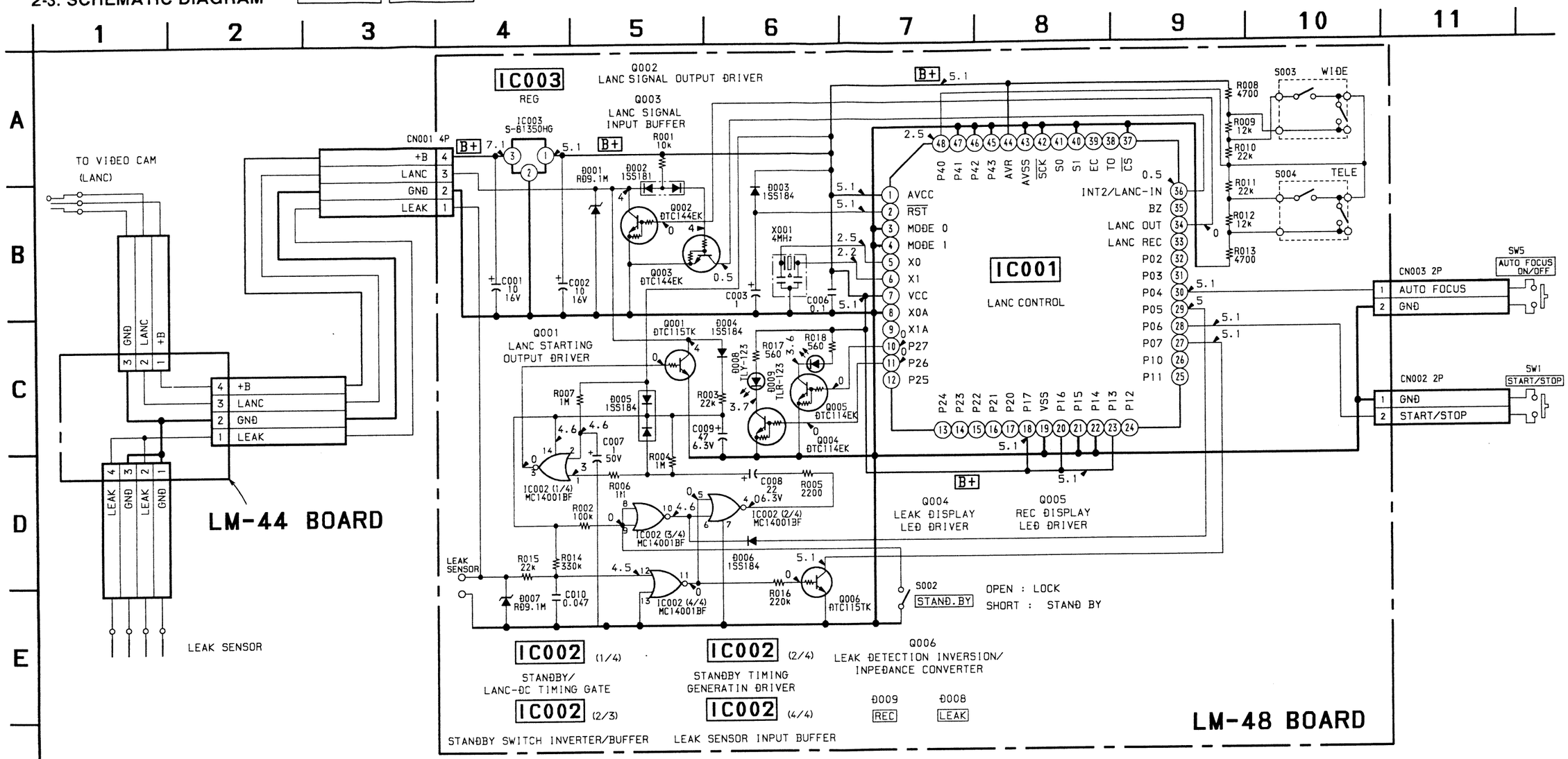




02

2-3. SCHEMATIC DIAGRAM

LM-48 **LM-44** (Ref. No. LM-48 BOARD : 1.000 Series)



For schematic diagram :

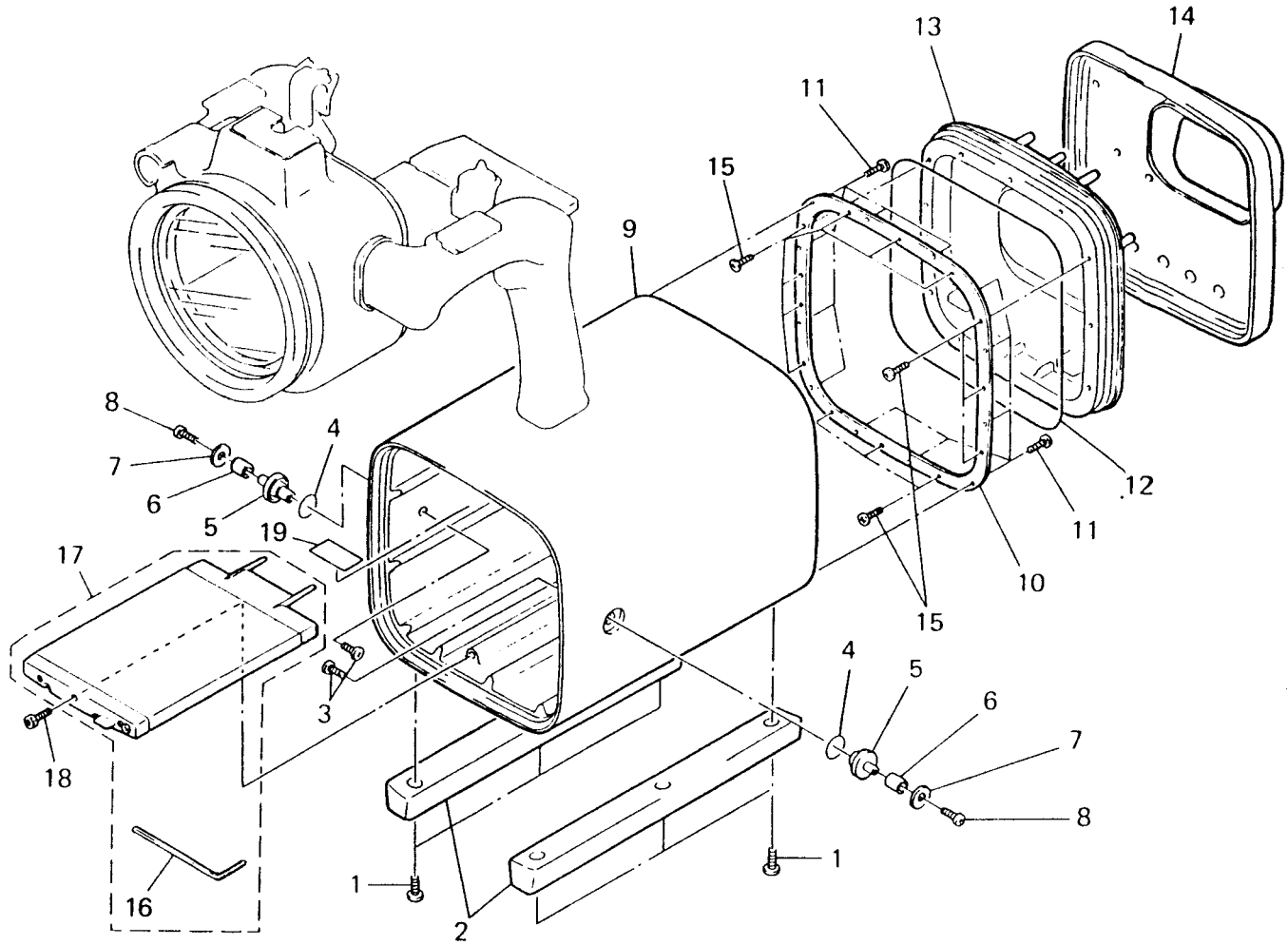
- Caution when replacing chip parts.
  New parts must be attached after removal of chip.
  Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, chip resistors are 1/10W unless otherwise noted. kΩ : 1000Ω, MΩ : 1000kΩ.
- All capacitors are in μF unless otherwise noted. pF : μμF. 50V or less are not indicated except for electrolytics and tantalums.
- B+ : B+ line.
- Readings are taken with a digital multimeter (DC10MΩ).

MPK-TRA2/TRA2K

SECTION 3
EXPLODED VIEWS

NOTE :
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- The construction parts of an assembled part are indicated with a collation number in the remark column.
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.

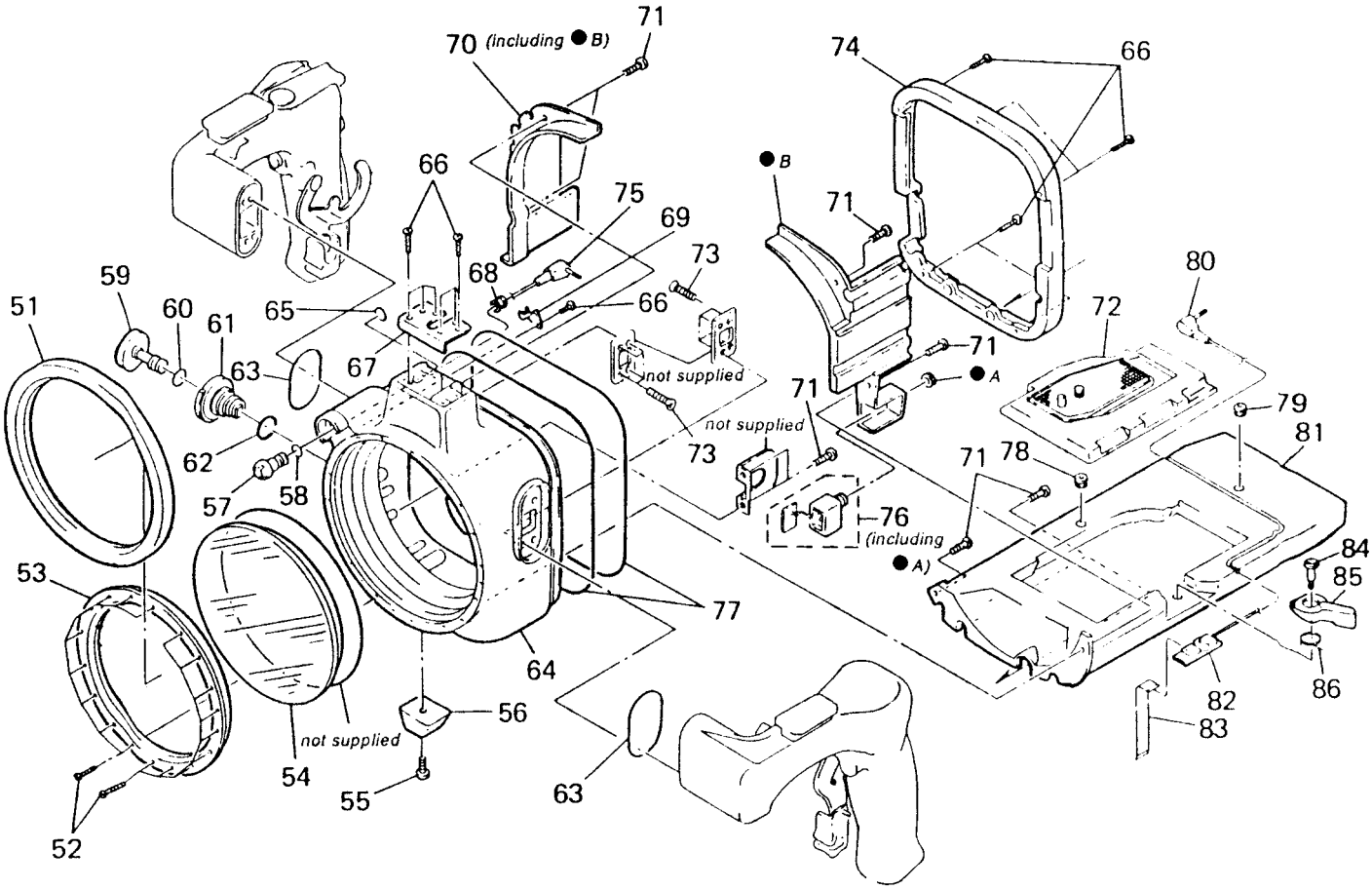
3-1. MAIN SECTION-1



Ref. No.	Part No.	Description	Remark
1	3-950-861-01	SCREW (M4X6)	
2	3-952-922-01	GUIDE, PIPE	
3	3-951-373-01	SCREW (M5X6), PLUS (BV)	
4	3-950-858-01	RING (P-9), O	
5	3-950-859-01	PIN, LOCK	
6	3-952-626-01	COLLAR, LOCK PIN	
7	3-952-627-01	WASHER	
8	3-952-629-01	SCREW (M3X5)	
9	3-952-921-11	PIPE, MIDWAY	
* 10	3-952-920-01	PLATE, FIXED, REAR COVER	

Ref. No.	Part No.	Description	Remark
11	3-950-857-01	SCREW (M2X5)	
12	3-952-928-01	RING (GS-165), O	
13	3-952-917-01	COVER, REAR	
14	3-952-918-01	PROTECTOR, REAR	
15	2-115-925-01	SCREW (2) (M2X5), TAPPING	
16	3-952-942-01	WRENCH, HEXAGON	
17	X-3942-700-1	WEIGHT ASSY, BALANCE	
18	2-186-308-11	BOLT (M4X15), HOLE, HEXAGON	
19	3-953-857-01	LABEL, CAUTION	

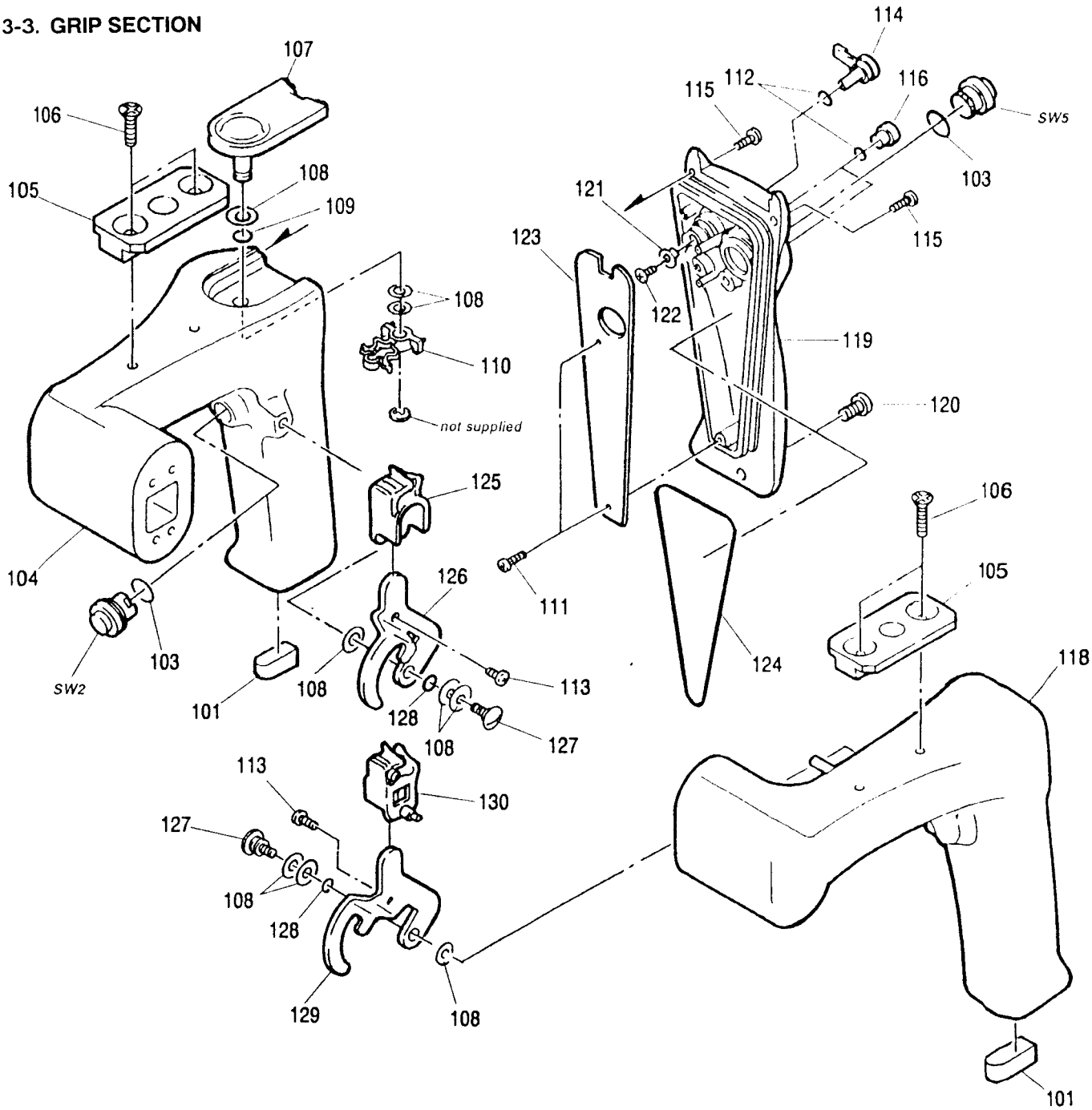
3-2. MAIN SECTION-2



Ref. No.	Part No.	Description	Remark
51	3-952-932-01	PROTECTOR, FRONT	
52	2-115-925-21	SCREW (M2X8)	
53	3-952-930-01	RETAINER, FRONT GLASS	
54	3-952-931-01	GLASS, FRONT	
55	3-952-934-01	SCREW (M3X12) (B TIGHT)	
* 56	3-952-933-01	PROTECTOR	
57	X-3942-405-1	MICROPHONE ASSY, UNDERWATER	
58	3-950-907-01	RING (S-8), O	
59	3-951-375-01	CAP, CONNECTOR	
60	3-950-888-01	RING (P-11), O	
61	X-3942-407-1	TERMINAL ASSY, OUTER	
62	3-950-847-01	RING (P-20), O	
63	3-950-844-01	RING (JASO2031), O	
64	3-952-923-01	CASE, FRONT	
65	3-950-846-01	RING (P-7), O	
66	2-115-925-01	SCREW (2) (M2X5), TAPPING	
* 67	3-952-924-01	SHOE, ACCESSORY	
68	3-950-869-01	BUSHING, RUBBER	

Ref. No.	Part No.	Description	Remark
* 69	3-952-927-01	PLATE, FIXED, MICROPHONE	
* 70	3-952-925-11	COVER, FRONT CASE INNER(including ●B)	
71	2-186-307-01	SCREW (M3X8)	
72	X-3944-249-1	BASE ASSY, CAMERA	
73	3-950-849-01	SCREW (M4X16)	
* 74	3-952-929-01	RING, REINFORCEMENT	
75	1-696-932-21	CORD, CONNECTION(MIC)	
76	1-951-214-21	HARNESS, VIDEO RELAY(including ●A)	
77	3-952-928-01	RING (GS-165), O	
78	3-950-854-01	BUSHING, RUBBER	
79	3-306-006-00	CUSHION, MOTOR	
80	1-696-933-41	CORD, CONNECTION(LANC)	
81	3-959-696-01	BASE, MAIN	
* 82	1-646-724-11	LM-44 BOARD	
83	1-696-021-31	WIRE(LEAK SENSOR)	
84	2-181-672-01	SHAFT, LOCK LEVER	
85	2-181-677-01	LEVER, LOCK	
86	3-952-940-01	SPRING, LOCK LEVER	

3-3. GRIP SECTION



Ref. No.	Part No.	Description	Remark
101	2-182-594-01	FOOT, RUBBER	
103	3-950-888-01	RING (P-11), O	
104	3-950-882-01	GRIP, R	
105	2-115-923-01	SHOE, BRACKET	
106	3-950-884-01	SCREW (M5X15)	
107	3-950-891-01	KNOB, ZOOM	
108	3-952-079-01	WASHER, THRUST	
109	3-950-887-01	RING (P-4), O	
* 110	3-957-183-01	SPRING, ZOOM LEVER	
111	2-115-925-01	SCREW (2) (M2X5), TAPPING	
112	3-950-880-01	RING (S-4), O	
113	2-398-048-11	SCREW (2.6X8), TAPPING, +P	
114	3-950-890-01	KNOB, POWER	
115	3-954-960-01	SCREW (M3X6), DAMPER	
116	3-950-896-01	WINDOW, LED	

Ref. No.	Part No.	Description	Remark
118	3-950-878-01	GRIP, L	
119	3-950-885-11	COVER, GRIP (R)	
120	3-954-959-01	SCREW (M5X12), DAMPER	
* 121	3-957-184-01	LEVER, POWER	
122	3-950-895-01	SCREW (M1.7X3) (BT)	
* 123	A-7071-942-A	LM-48 BOARD, COMPLETE	
124	3-950-886-01	RING, O	
125	3-950-875-01	COVER (R), CAM	
126	3-950-872-01	CAM (R), LOCK	
127	3-950-874-01	PIN, LOCK CAM	
128	2-115-924-91	RING, O	
129	3-950-873-01	CAM (L), LOCK	
130	3-950-876-01	COVER (L), CAM	
SW2	X-3942-410-1	BUTTON ASSY, REC	
SW5	X-3942-412-1	BUTTON ASSY, AF SELECTION	

MPK-TRA2/TRA2K

LM-44 **LM-48**

SECTION 4
ELECTRICAL PARTS LIST

NOTE :
- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX, -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms
  METAL : Metal-film resistor
  METAL OXIDE : Metal oxide-film resistor
  F : nonflammable
- Items marked " * "are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u : μ , for example :
  uA.... : μA.... , uPA.... : μPA....
  uPB.... : μPB.... , uPC.... : μPC....
  uPD.... : μPD....
- CAPACITORS
  uF : μF
- COILS
  uH : μH

When indicating parts by reference number, please include the board.

Ref.No.	Part No.	Description			Remark
*	1-646-724-11	LM-44 BOARD			
		**********			
*	1-564-719-11	PIN, CONNECTOR (SMALL TYPE) 3P			
*	1-565-215-11	SOCKET, CONNECTOR 4P			
*	1-566-759-11	PIN, CONNECTOR (PC BOARD) 4P BOARD			
**********					
*	A-7071-942-A	LM-48 BOARD, COMPLETE			
		**********			
		(Ref.No.1000 series)			
		< CAPACITOR >			
C001	1-124-779-00	ELECT CHIP	10uF	20%	16V
C002	1-124-779-00	ELECT CHIP	10uF	20%	16V
C003	1-126-193-11	ELECT	1uF	20%	50V
C006	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C007	1-126-193-11	ELECT	1uF	20%	50V
C008	1-124-778-00	ELECT CHIP	22uF	20%	6.3V
C009	1-126-205-11	ELECT CHIP	47uF	20%	6.3V
C010	1-163-035-00	CERAMIC CHIP	0.047uF		50V
		< CONNECTOR >			
* CN001	1-566-759-11	PIN, CONNECTOR (PC BOARD) 4P			
CN002	1-566-757-11	PIN, CONNECTOR (PC BOARD) 2P			
CN003	1-566-757-11	PIN, CONNECTOR (PC BOARD) 2P			
		< DIODE >			
D001	8-719-106-44	DIODE	RD9.1M-B2		
D002	8-719-820-05	DIODE	1SS181		
D003	8-719-801-78	DIODE	1SS184		
D004	8-719-801-78	DIODE	1SS184		
D005	8-719-801-78	DIODE	1SS184		
D006	8-719-801-78	DIODE	1SS184		
D007	8-719-106-44	DIODE	RD9.1M-B2		
D008	8-719-812-32	LED	TLY123(LEAK)		
D009	8-719-812-31	LED	TLR123(REC)		
		< IC >			
IC001	8-759-197-90	IC	MB89131-149		
IC002	8-759-008-74	IC	MC14001BF		
IC003	8-759-512-69	IC	S-81350HG-KD		

Ref.No.	Part No.	Description			Remark
		< TRANSISTOR >			
Q001	8-729-023-52	TRANSISTOR	DTC115TK-T146		
Q002	8-729-901-01	TRANSISTOR	DTC144EK		
Q003	8-729-901-01	TRANSISTOR	DTC144EK		
Q004	8-729-900-53	TRANSISTOR	DTC114EK		
Q005	8-729-900-53	TRANSISTOR	DTC114EK		
Q006	8-729-023-52	TRANSISTOR	DTC115TK-T146		
		< RESISTOR >			
R001	1-216-073-00	METAL CHIP	10K	5%	1/10W
R002	1-216-097-00	METAL CHIP	100K	5%	1/10W
R003	1-216-081-00	METAL CHIP	22K	5%	1/10W
R004	1-216-121-00	METAL CHIP	1M	5%	1/10W
R005	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R006	1-216-121-00	METAL CHIP	1M	5%	1/10W
R007	1-216-121-00	METAL CHIP	1M	5%	1/10W
R008	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R009	1-216-075-00	METAL CHIP	12K	5%	1/10W
R010	1-216-081-00	METAL CHIP	22K	5%	1/10W
R011	1-216-081-00	METAL CHIP	22K	5%	1/10W
R012	1-216-075-00	METAL CHIP	12K	5%	1/10W
R013	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R014	1-216-109-00	METAL CHIP	330K	5%	1/10W
R015	1-216-081-00	METAL CHIP	22K	5%	1/10W
R016	1-216-105-00	METAL CHIP	220K	5%	1/10W
R017	1-216-043-00	METAL CHIP	560	5%	1/10W
R018	1-216-043-00	METAL CHIP	560	5%	1/10W
		< SWITCH >			
S002	1-572-688-11	SWITCH, PUSH (1 KEY)(STANDBY)			
S003	1-692-247-11	SWITCH, TACTIL (2 CLICK)(W)			
S004	1-692-247-11	SWITCH, TACTIL (2 CLICK)(T)			
		< CRYSTAL >			
X001	1-579-902-11	VIBRATOR, CERAMIC(4MHz)			
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Ref. No.	Part No.	Description	Remark
		MISCELLANEOUS	
		**********	
75	1-696-932-21	CORD, CONNECTION(MIC)	
76	1-951-214-21	HARNESS, VIDEO RELAY(including ●A)	
80	1-696-933-41	CORD, CONNECTION(LANC)	
83	1-696-021-31	WIRE(LEAK SENSOR)	
SW2	X-3942-410-1	BUTTON ASSY, REC	
SW5	X-3942-412-1	BUTTON ASSY, AF SELECTION	

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ACCESSORIES & PACKING MATERIALS

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MPK-TRA2 only(US,Canadian,AEP,UK)

	2-115-921-01	GREASE
	3-681-190-01	SHEET (LARGE), PROTECTION
	3-759-064-11	MANUAL, INSTRUCTION (ENGLISH/FRENCH/SPANISH)
	3-759-064-41	MANUAL, INSTRUCTION(GERMAN/DUTCH/ SWEDISH/ITALIAN)(TRA2:AEP,UK/TRA2K)
	3-759-064-51	MANUAL, INSTRUCTION(CHINESE/ARABIC) (TRA2:AEP,UK/TRA2K)
	3-952-928-01	RING (GS-165), O
*	3-952-980-01	INDIVIDUAL CARTON(TRA2)
*	3-953-232-01	CUSHION (UPPER)(TRA2)
*	3-953-233-01	CUSHION (LOWER)(TRA2)

MPK-TRA2K (MPK-TRA2 + CARRYING CASE)(AEP,UK)

	2-115-921-01	GREASE
	3-681-190-01	SHEET (LARGE), PROTECTION
	3-759-064-11	MANUAL, INSTRUCTION (ENGLISH/FRENCH/SPANISH)
	3-759-064-41	MANUAL, INSTRUCTION(GERMAN/DUTCH/ SWEDISH/ITALIAN)(TRA2:AEP,UK/TRA2K)
	3-759-064-51	MANUAL, INSTRUCTION(CHINESE/ARABIC) (TRA2:AEP,UK/TRA2K)
*	3-951-245-51	INDIVIDUAL CARTON(TRA2K)
*	3-951-367-01	CASE (MAIN), CARRYING(TRA2K)
	3-951-368-01	CUSHION (UPPER)(TRA2K)
	3-951-369-01	CUSHION (LOWER)(TRA2K)
	3-951-370-01	KEY(TRA2K)
	3-951-371-01	BELT, CARRYING(TRA2K)
*	3-951-448-01	CUSHION(TRA2K)
	3-952-928-01	RING (GS-165), O
	A-6776-242-A	FINDER(TR900)BLOCK ASSY, SPORTS (TRA2K)
	A-6776-243-A	FINDER BLOCK ASSY, SPORTS(TRA2K)